

# *Homo heidelbergensis*

***Homo heidelbergensis*** is an extinct species or subspecies of archaic humans in the genus *Homo*, which radiated in the Middle Pleistocene from about 700,000 to 300,000 years ago.<sup>[note 1]</sup> The derivation of *H. sapiens* from *H. rhodesiensis* has often been proposed, but is obscured by a fossil gap from 400–260 kya.<sup>[note 2]</sup> The species was originally named *Homo heidelbergensis* due to the skeleton's first discovery near Heidelberg, Germany.<sup>[2]</sup>

The first discovery—a mandible—was made in 1907 by Otto Schoetensack.<sup>[2][3]</sup> The skulls of this species share features with both *H. erectus* and modern humans; its brain was nearly as large as that of modern humans.<sup>[4]</sup> The Sima de los Huesos cave at Atapuerca in northern Spain holds particularly rich layers of deposits where excavations were still in progress as of 2018.<sup>[5][6][7][8]</sup>

*H. heidelbergensis* was dispersed throughout Eastern and Southern Africa (Ethiopia, Namibia, Southern Africa) as well as Europe (England, France, Germany, Greece, Hungary, Italy, Portugal, Spain).<sup>[9]</sup> Its exact relation both to the earlier *H. antecessor* and *H. ergaster*, and to the later species Neanderthals, Denisovans, and modern humans is unclear.<sup>[10][11][12]</sup>

Modern humans have been proposed to derive from *H. heidelbergensis* via *H. rhodesiensis*, present in East and North Africa from around 400 kya.<sup>[13][14]</sup> The correct assignment of many fossils to a particular chronospecies is difficult and often differences in opinion ensue among paleoanthropologists due to the absence of universally accepted dividing lines (autapomorphies) between *H. erectus*, *H. heidelbergensis*, and Neanderthals.

It is uncertain whether *H. heidelbergensis* is ancestral to modern humans, as a fossil gap in Africa between 400–260 thousand years ago obscures the presumed derivation of *H. sapiens* from *H. rhodesiensis*.<sup>[note 2]</sup> Genetic analysis of the Sima de los Huesos fossils (Meyer et al. 2016) seems to suggest that *H. heidelbergensis* in its entirety should be included in the Neanderthal lineage, as "pre-Neanderthal" or "archaic Neanderthal" or "early Neanderthal", while the divergence time between the Neanderthal and modern lineages has been pushed back to before the emergence of *H. heidelbergensis*, to about 600,000 to 800,000 years ago, the approximate time of the disappearance of *Homo antecessor*.<sup>[15][16]</sup>

The delineation between early *H. heidelbergensis* and *H. erectus* is also unclear.<sup>[8][17][18]</sup>

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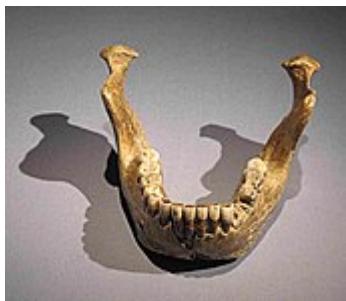
Schoetensack, 1908

## Synonyms

† *Homo rhodesiensis*  
(Woodward, 1921)

# Taxonomy

## Research history



Mauer 1, the type specimen

The type specimen, Mauer 1 (a jawbone), was discovered by worker Daniel Hartmann in Mauer, to the southeast of Heidelberg, Germany, and was described in 1907 by German anthropologist Otto Schoetensack. He noted a lack of a distinct chin, but conceded that it had clearly belonged to a human form due to the humanlike teeth.<sup>[19]</sup> More fossils were subsequently found in Steinheim an der Murr, Germany (the Steinheim skull); Arago, France (Tautavel Man); Petalona, Greece; and Ciampate del Diavolo, Italy.

In 1921, a skull, Kabwe 1, was discovered by Swiss miner Tom Zwiglaar in Kabwe, Zambia (Zambia at the time was called Northern Rhodesia), and was tentatively assigned to a new species, *H. rhodesiensis*, by English palaeontologist Arthur Smith Woodward.<sup>[20]</sup> Kabwe 1 dates to around 300,000 years ago.<sup>[21]</sup> In 1976, the 600,000 year old Bodo cranium was discovered in the Middle Awash, Ethiopia, but was classified into *H. heidelbergensis* as *H. rhodesiensis* was beginning to fall out of favour.<sup>[22][23]</sup> The 400,000 year old Tanzanian Ndutu cranium has been classified as an "archaic *H. sapiens*".<sup>[24]</sup> The South African Saldanha cranium, or Elandsfontein cranium, discovered in 1954 was assigned to *H. heidelbergensis*.<sup>[25]</sup>



The Ciampate del Diavolo near the extinct Roccamontina volcano in Italy, fossilised hominid footprints dated to around 350,000 years ago and attributed to *Homo heidelbergensis*.

The Chinese Dali Man and Maba Man could represent Asian *H. heidelbergensis*.

In 1992, the 350,000 year old Sima de los Huesos site in the Sierra de Atapuerca in northern Spain was discovered, which has since yielded 5,500 bones belonging to perhaps 32 individuals, about 90% of known *H. heidelbergensis* remains. These individuals are thought to represent the immediate ancestors to Neanderthals or are themselves

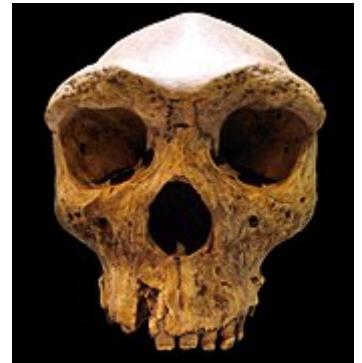
early Neanderthals.<sup>[26]</sup> In 1994, Boxgrove Man was discovered near the English Channel in association with hundreds of hand axes dating to 524–478,000 years ago.<sup>[27]</sup>

## Classification

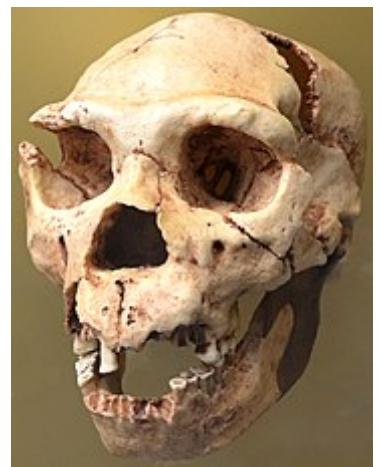
*H. heidelbergensis* is generally considered to have been the direct ancestor to modern humans<sup>[2]</sup> (though African members are alternatively classified as *H. rhodesiensis* or archaic *H. sapiens*<sup>[28][29][24]</sup>), Neanderthals,<sup>[30][2]</sup> and Denisovans.<sup>[31]</sup> This would make *H. heidelbergensis* a chronospecies.<sup>[32]</sup> *H. heidelbergensis* has also been described as a potential polytypic species, with different populations possibly being sufficiently different enough to qualify as being different subspecies.<sup>[33]</sup> The transitional forms for both species is obscured by a large gap in the fossil record about 400–300,000 years ago.<sup>[1]</sup> Thus, the timing of the replacement of *H. heidelbergensis* by descendant species is generally a matter of convention.<sup>[30]</sup>

Similarly, the timing of the derivation of *H. heidelbergensis* from an ancestor species is also unclear.<sup>[34]</sup> The oldest identified *H. heidelbergensis* fossils date to about 600,000 years ago. Stone tools discovered in 2005 from Pakefield, Suffolk, indicate human activity in England 700,000 years ago, and at the time these tools were assumed to have been created by a transitional form between *H. heidelbergensis* and the older European human *H. antecessor*.<sup>[35][36][37][38]</sup> However, enamel proteome analysis suggests that *H. antecessor* is not ancestral to *H. heidelbergensis*, but closely related nonetheless.<sup>[39]</sup> *H. heidelbergensis* may instead derive from African or European *H. erectus*, which also existed contemporaneously.

Until the 1990s, *H. heidelbergensis* was commonly classified as a subspecies of *H. erectus* (*H. e. heidelbergensis*). With the discovery of more complete remains, *H. heidelbergensis* has since become accepted as a unique species.<sup>[40][41]</sup> The paleontology institute at Heidelberg University, where the type specimen has been kept since 1908, changed the label from the subspecies to the species classification in 2015.<sup>[42]</sup>



Replica of the Kabwe 1 skull



"Miguelón" from Sima de los Huesos

## Morphology

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Reconstruction of Kabwe 1 (left) and a Sima de los Huesos individual (right) by Élisabeth Daynès

The average brain capacity of 10 *H. heidelbergensis* specimens from across Africa and Eurasia was 1,206 cc (73.6 cu in).<sup>[43]</sup> Kabwe 1 has been estimated at 1,230 cm<sup>3</sup> (75 cu in).<sup>[44]</sup> For comparison, the average brain capacity for contemporaneous *H. erectus* was 973 cc (59.4 cu in),<sup>[43]</sup> and modern humans 1,270 cc (78 cu in) for males and 1,130 cc (69 cu in) for females.<sup>[45]</sup>

Male *H. heidelbergensis* averaged about 175 cm (5 ft 9 in) tall and 62 kg (136 lb), and females 1.57 m (5 ft 2 in) and 51 kg (112 lb).<sup>[46]</sup> An analysis of 27 limb bones Sima de los Huesos calculated an average size of about 170 cm (5 ft 7 in) in height, which is similar to the average for Neanderthals and pre-industrial modern humans.<sup>[47]</sup> According to South African palaeoanthropologist Lee Rogers Berger, tibiae and femora remains indicate that the average height 400–350,000 years ago reached 2.1 m (7 ft) during a grassland expansion which supported larger prey items.<sup>[48]</sup>

## Behavior

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A biface nicknamed *Excalibur* from Sima de los Huesos<sup>[49]</sup> is hypothesised to have been a grave good, which, if correct, would be the oldest evidence of funerary practices.<sup>[49][50][51]</sup>

The morphology of the outer and middle ear suggests they had an auditory sensitivity similar to modern humans. They were probably able to differentiate between many different sounds.<sup>[52]</sup> Dental wear analysis suggests they were as likely to be right-handed as modern people.<sup>[53]</sup>

An archeological site in Schöningen, Germany contained eight exceptionally-well preserved roughly-400,000-year-old spears for hunting, and various other wooden tools. Five-hundred-thousand-year-old hafted stone points used for hunting are reported from Kathu Pan 1 in South Africa, tested by way of use-wear replication.<sup>[54]</sup> This find could mean that modern humans and Neanderthals inherited the stone-tipped spear, rather than developing the technology independently.<sup>[54][55][56]</sup>

No forms of art have been uncovered. Red ochre, a mineral that can be used to mix a red pigment which is useful as a paint, has been found at Terra Amata in France and Bečov in the Czech Republic, but the dating of these pigments to the Middle Pleistocene is contested.<sup>[57]</sup>

The Schöningen spears are eight wooden throwing spears, dated to before 300,000 years ago, discovered between 1994 and 1998 in the open-cast lignite mine, in Schöningen, county Helmstedt, Germany, together with thousands of animal bones. They are regarded as the first direct evidence for active hunting by *H. heidelbergensis* (pre-Neanderthals).<sup>[58][59][60]</sup>

## Language

Steven Mithen<sup>[61]</sup> believes that *H. heidelbergensis*, like its descendant *H. neanderthalensis*, acquired a pre-linguistic system of communication.

*Homo heidelbergensis* is thought to have been the first ancestor of modern humans not to have air sacs, which are laryngeal diverticula involved in vocalization. The loss of air sacs may have contributed to humans' ability to develop vocal language. Ancestors such as *Australopithecus afarensis* did have air sacs, as do other great apes.<sup>[62]</sup> Furthermore, there is evidence that *Homo heidelbergensis* was right-handed. Handedness is associated with the development of language among hominins.<sup>[63]</sup> Considering this evidence, scientists have hypothesized about the speaking capabilities of the species. A recent study that compared the speech



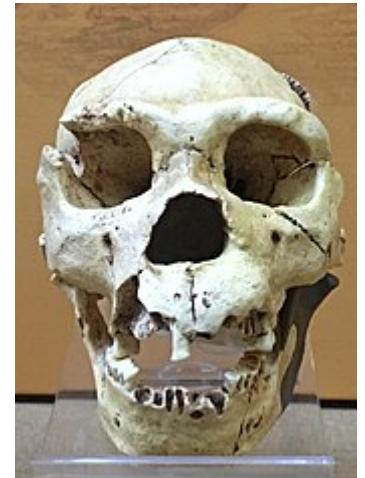
One of hundreds of handaxes found at Boxgrove

frequency of humans and chimpanzees reported that *H. heidelbergensis* speech abilities more closely resemble those of modern-day humans. More specifically, "the Atapuerca SH hominins show[ed] a bandwidth that [wa]s slightly displaced and considerably extended to encompass the frequencies that contain relevant acoustic information in human speech."<sup>[64]</sup>

## Pathology

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The earliest documented case of odontogenic orbital cellulitis, a severe eye infection that develops from an abscess in the mouth, occurred in *H. heidelbergensis*.<sup>[66][67]</sup>



## See also

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- [Altamura man](#)
- [Homo cepranensis](#)
- [Homo rhodesiensis](#)
- [Human timeline](#)
- [List of fossil sites \(with link directory\)](#)
- [List of human evolution fossils](#)
- [Swanscombe Heritage Park](#)

## Notes

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1. The fossil range spans about 0.6 to 0.4 Ma; cladistically, *H. heidelbergensis* is estimated to have developed from *H. erectus* (or *H. antecessor*) around 0.8–0.7 Ma, and given rise to *H. neanderthalensis* (and possibly *H. sapiens*) around 0.4–0.3 Ma.
2. "Most, if not all, of the African specimens assigned to *H. rhodesiensis* (*cf heidelbergensis*) seem to predate the divergence between *H. neanderthalensis* and *H. sapiens* [viz., assumed at 0.5 Mya prior to the revision by Meyer et al. 2016]. However, a gap in the fossil record, possibly between 400 and 260 ka, blurs the transition or punctuation event that separated *H. rhodesiensis* and *H. sapiens*."<sup>[1]</sup>

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## External links

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